WiRobot™
The Heart of Robot

DRK6000/8000 System Specification

DRK6000 Wireless Mobile System
DRK8000 Wireless Mobile Animated Head System

DrRobot®

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Related Documents

WiRobot SDK API Reference Manual
WiRobot PMS5005 Sensing and Motion Controller User Manual
WiRobot PMB5010 Multimedia Controller User Manual

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I. WiRobot DRK6000/8000 Overview

WiRobot is an integrated electronic and software robotic system extended from Dr Robot's comprehensive humanoid robot. Each WiRobot development system is designed to provide a user-friendly programming environment for hobbyists, students and researchers to develop their advanced robot programs and applications at an affordable cost. The DRK6000/8000 development system includes the respective mechanical structure, electronic modules as well as the software development kit (SDK). The mechanical structure is already pre-built and the electronic system is setup with a Multimedia Controller (PMB5010), a Sensing-Motion Controller (PMS5005) and various peripheral electronic modules. The software component will be installed on a PC and is responsible to establish a wireless connection and exchange data with the robot. User can develop their own applications in VC++ or VB using the APIs offered in "WiRobot SDK ActiveX Module" which accesses the sensor information, sends control command and configures the system setting.

I.1. Standard Electronics components and Operation Detail

WiRobot DRK6000/8000 Specifications:

On-Board CPUs	Over 120MIPS 16-bit fix-point DSP in total		
On-Board Storage	1M x 16-bit words flash, Up to 256K x 16-bit words SRAM		
Degree of Freedom	2 x wheel motion, 2 x camera motion (Pan + Tilt) , up to 6 servos and 6 DC motors		
Built-in Peripheral Interface and Modules		DRK6000	DRK8000
	8-bit CIF (352 x 288) Color CMOS Camera Module	X1	X1
	Audio codec and amplifier module with mic. and speakers	X1	X1
	128 x 64 graphic LCD display module	X1	X1
	115kbps wireless module	X1	X1
	General-purpose PWM DC motor control	X6	X6
	DC motors (up to 6)	X2	X2
	Servo motors (up to 6)	X2	X5
	Quadrature Encoder Inputs	X2	X2
	Ultrasonic sensor modules (up to 6)	X4	X6
	Potentiometer position feedback sensor (up to 6)	X4	X4
	Human sensor module (up to 2)	X1	X2
	Infrared range sensor input	X1	X1
	Ambient temperature sensor modules		X1
	Tilt/acceleration sensor modules		X1
	Custom A/D inputs	X8	X8
	Digital inputs	X8	X8
	Digital outputs	X8	X8
	Full duplex serial communication interface (SCI)	X2	X2
	Full duplex infrared remote control and communication interface	X1	X1
Wireless Operation Range	15 meter indoor 35 meter line of sight		
Power Supply	7.2V Ni-MH 2100mAh		
Operation Time	with 2100mAh battery	1.5hr	1.2hr
	with 3300mAh battery	2.5hr	2.2hr
Maximum Moving Speed	Approx. 9 meter per minute		
Additional/Optional Peripheral Modules	Ambient temperature sensor modules	X1	
	Tilt/acceleration sensor modules	X1	
	DC motor	X4	X4
	Servo	X4	X1
	Ultrasonic sensor module	X2	
	Potentiometer position feedback sensor	X2	X2
	Human sensor module	X1	
	1 x Smart fast charger	X1	X1
	1 x 7.2V Ni-MH 3300mAh	X1	X1

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With this specification, the standard WiRobot DRK series system will come with the following electronic modules:

Part Number	Name	DRK6000	DRK8000
PMS5005	Robot Sensing and Motion Controller	1	1
PMS5010	Multimedia Controller	1	1
MDM5253	DC Motor Driver Module with Position and Current Feedback	2	2
MCI3908	Color Image Module With Camera	1	1
DUR5200	Ultrasonic Range Sensor Module	4	6
DHM5150	Pyroelectric Human Motion Sensor Module	1	2
DTA5102	Tilt/Acceleration Sensor Module	0	1
DAT5280	Ambient Temperature Sensor Module	0	1
GP2Y0A21YK	Sharp IR Distance Measuring Sensor Module	1	1
MCB3100	Serial Bluetooth Wireless Module	2	2
MCR3210	RS232 Interface Module	1	1
MCR3210P	RS232 Interface Module with Power Connector	1	1
BAS8100	8 Ohm 1W Speaker	1	1
MAC5310	Audio Codec and Audio Power Amplifier Module	1	1
SAM5247	Uni-directional Electret Microphone	1	1
MIR5538	38kHz Infrared Remote Controller Module	1	1
DIR5538	38kHz Infrared Remote Controller	1	1
CCR2150	RS232 Cross-over Serial Cable	1	1
MGL5128	128x64 Graphic LCD Module	1	1
MRS3302	Rotary Sensor Module	4	4
N/A	Servo	2	5
N/A	DC Motor	2	2
BPN7220	7.2V Ni-MH 2100mAh Battery Pack	1	1

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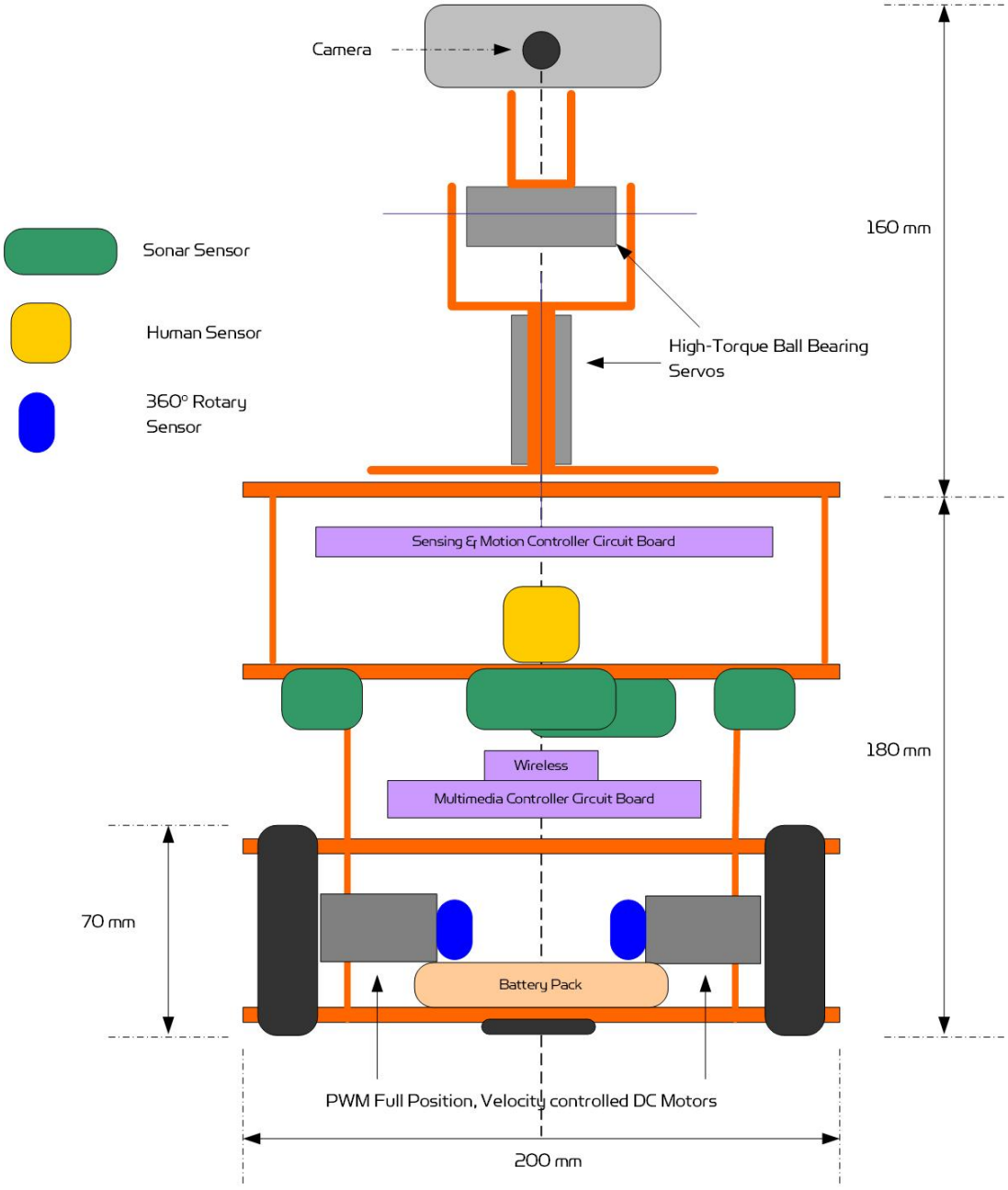
I.2. Mechanical Specification

The following two diagrams illustrate the mechanical structure of the WiRobot DRK6000 and DRK8000 system:



Note: the dimension and location are for description purpose only, exact value is subject to change without notice.

Figure I.1 WiRobot DRK6000

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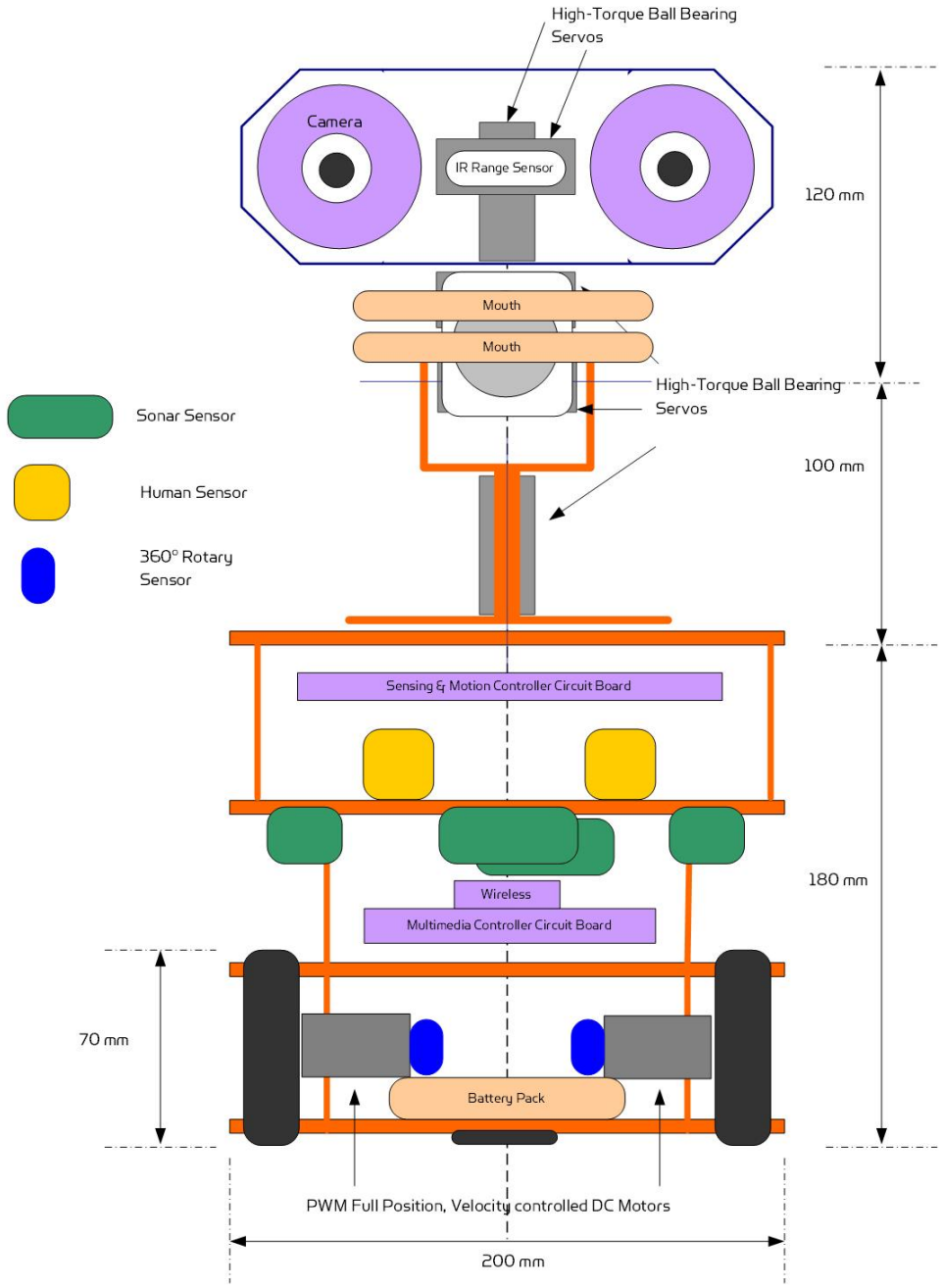

Note: the dimension and location are for description purpose only, exact value is subject to change without notice.

Figure I.2 WiRobot DRK8000

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I.3. Electrical

I.3.1. Power

The DRK6000/8000 is powered by a single 7.2V battery pack. This battery pack is connected to both PMS5005 and PMB5010 through a switch. User can turn on or turn off the system (both PMS5005 and PMB5010) by pressing the switch.

I.3.2. Communication

In the DRK6000/8000 system, PMS5005 and PMB5010 are connected together between PMB5010's Lower Reach SCI1 and PMS5005's Upper reach SCI0. A wireless module is placed on PMB5010's Upper Reach SCI0 in order to communicate with a PC.

I.3.3. Electrical Modules

In this system, all electrical modules are located and connected as followed:

Electrical Module	**DRK 6000 Location / Setting**	**DRK 8000 Location / Setting**
Ultrasonic #1	Left front	Left front
Ultrasonic #2	Middle front	Middle front
Ultrasonic #3	Right front	Right front
Ultrasonic #4	Middle rear	Right rear
Ultrasonic #5		Middle rear
Ultrasonic #6		Left rear
Human Sensor #1	Middle front	Left front
Human Sensor #2		Right front
Infrared Range Sensor	Under the camera box	Between eyes
Infrared Sensor	Front	Front
Temperature Sensor		Rear
Acceleration and Tilting Sensor		Inside the robot
Servo #1	To control the left/right movement of the neck (use channel 1)	To control the up/down movement of the neck (use channel 1)
Servo #2	To control the up/down movement of the neck (use channel 2)	To control the left/right movement of the neck (use channel 2)
Servo #3		To control the mouth (use channel 3)
Servo #4		In between eyes to control the up/down rotation of the eyes (use channel 5)
Servo #5		In between eyes to control the left/right rotation of the eyes (use channel 6)
DC Motor #1 with dual rotary sensors	Left , use channel 1	Left , use channel 1
DC Motor #2 with dual rotary sensors	Right, use channel 2	Right, use channel 2
LCD Display	Front	Front
Camera	Inside the camera box	Inside left eye
Speaker	Under the camera box	Located near the mouth

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Microphone	Beside the speaker	Near the Infrared range sensor

Please refer to PMS5005 User Manual for details on how to connect different sensors, DC motors, servos, and LCD display to the system. For camera, speaker and microphone, please refer to PMB5010 User Manual.

I.4. Other Specification

	DRK6000	**DRK8000**
Weight (including one battery pack)	~2kg	~2.5kg
Recommended Maximum Load	~2.5kg	~2.5kg

II. Miscellaneous

II.1. Recharging the WiRobot DRK6000/8000 system

User can simply take out the battery at the lowest deck of the robot to recharge. It will normally take about 20 hours to fully recharge the 2100mAh battery if slow charging is chosen. Fast charge would take about 1-2 hours.

II.2. Sensor Location

User can change the sensor mounted on the robot to different location to suit his/her needs. As well, user can add new sensors to the systems by making use of the available I/Os on the Sensing and Motion Controller (PMS5005). Driver for these I/Os have been pre-programmed, data will be sent to the PC for processing.

II.3. Known Issues

- When the power level is low, the robot's electrical system will become unstable. User has to monitor the power level and recharge the battery when it is low.
- The initialization of the robot (when powering on) will take about 3-10 seconds.
- Please make sure that the robot finished its initialization stage before WiRobot Gateway software (on PC) starts to connect to the robot. This may lead to failure connection between PC and the robot.

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